

Coding Boot Camp

learndelphi.org/boot-camp-2022





LearnDelphi.org

Session : Core11

Introduction to multi-dimensional arrays





About *Brandon Long*



LearnDelphi.org

Coding Boot Camp 2022

- Teacher of Information Technology (programming), Computer Applications Technology (computer literacy) and Mathematics
- Currently teaching in a high school in Gqeberha, South Africa and has taught in Auckland, New Zealand.
- Create programming videos (and other computer content) for my YouTube channels. Search for ***Mr Long IT and CAT*** 
- Embarcadero MVP
- Loves superheroes 



Session outline



LearnDelphi.org
Coding Boot Camp 2022

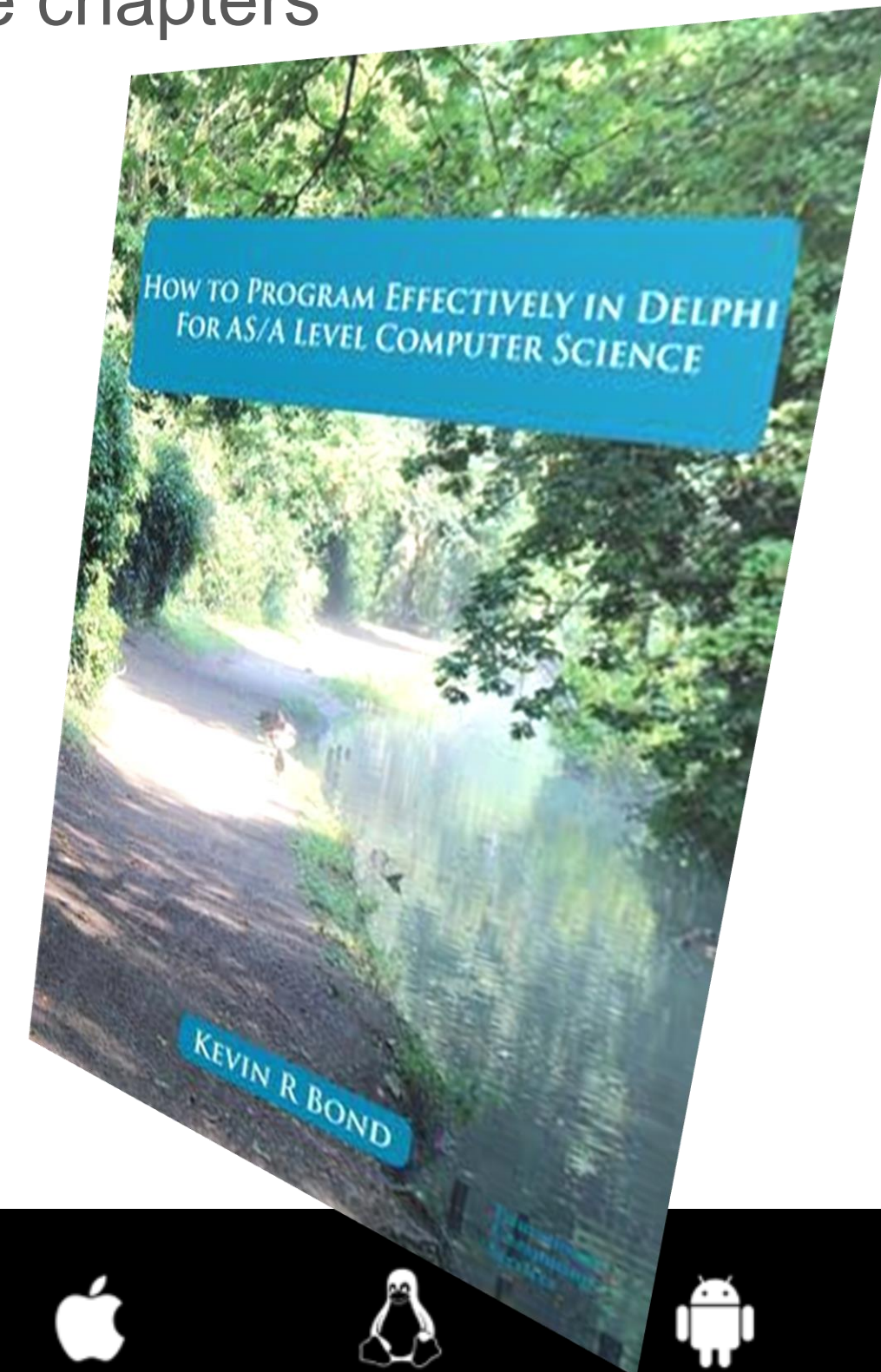
- What is a 1-dimensional *array*?
- What is a 2-dimensional *array*?
- Using 2-dimensional arrays
- What are other multidimensional *arrays*?

Textbook reference chapters

Chapter **14**

Arrays

Pages 237 - 243



What is a 1-dimensional *array*?



LearnDelphi.org
Coding Boot Camp 2022

```
var arrTimes : array[ 1 .. 10 ] of real ;
```

<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>...</i>	<i>10</i>
13.26	13.01	12.56	12.86	12.96	12.23	...	12.05

1 to 10 *real* numbers



What is a 1-dimensional *array*?

```
var arrTimes : array[ 1 .. 10 ] of real ;
```

Week 1

1	2	3	4	5	6	...	10
13.26	13.01	12.56	12.86	12.96	12.23	...	12.05

Week 2

1	2	3	4	5	6	...	10
12.56	12.64	12.06	13.16	12.50	12.44	...	12.29

Week 3

1	2	3	4	5	6	...	10
XX.XX	XX.XX	XX.XX	XX.XX	XX.XX	XX.XX	...	XX.XX

Week 4, Week 5, ...



What is a 1-dimensional *array*?

var arrTimeWeek1, arrTimeWeek2, ... : array[1 .. 10] of real ;

Week 1

1	2	3	4	5	6	...	10
13.26	13.01	12.56	12.86	12.96	12.23	...	12.05

Week 2

1	2	3	4	5	6	...	10
12.56	12.64	12.06	13.16	12.50	12.44	...	12.29

Week 3

1	2	3	4	5	6	...	10
XX.XX	XX.XX	XX.XX	XX.XX	XX.XX	XX.XX	...	XX.XX

Week 4, Week 5, ...



What is a *multidimensional array*?

var arrTimeWeek1, arrTimeWeek2, ... : array[1 .. 10] of real ;

	1	2	3	4	5	6	...	10
Week 1	13.26	13.01	12.56	12.86	12.96	12.23	...	12.05
Week 2	12.56	12.64	12.06	13.16	12.50	12.44	...	12.29
Week 3	XX.XX	XX.XX	XX.XX	XX.XX	XX.XX	XX.XX	...	XX.XX
Week 4								
Week 5								



What is a *multidimensional array*?



LearnDelphi.org
Coding Boot Camp 2022

```
var arrTimeWeek1, arrTimeWeek2, ...: array[ 1 .. 10 ] of real ;  
                Times
```

Weeks		1	2	3	4	5	6	...	10
	1	13.26	13.01	12.56	12.86	12.96	12.23	...	12.05
	2	12.56	12.64	12.06	13.16	12.50	12.44	...	12.29
	3	xx.xx	xx.xx	xx.xx	xx.xx	xx.xx	xx.xx	...	xx.xx
	4								
	5								



What is a *multidimensional array*?



LearnDelphi.org

Coding Boot Camp 2022

```
var arrTimes : array[1 .. 5, 1 .. 10] of real ;
```

Times

Weeks	1	2	3	4	5	6	...	10
1	13.2	12.05
2	12.56	12.01	12.00	10.10	12.00	12.11	...	12.29
3	XX.XX	XX.XX	XX.XX	XX.XX	XX.XX	XX.XX	...	XX.XX
4								
5								

2-dimensional (2D) array



Extra



LearnDelphi.org
Coding Boot Camp 2022

tStringGrid

. FixedRows := 1



Extra



LearnDelphi.org
Coding Boot Camp 2022

tStringGrid

. FixedCols := 1

A diagram of a `tStringGrid` component. It is a rectangular grid with 6 columns and 6 rows. The first column is highlighted with a light blue background. The second row of the first column is highlighted with a darker blue background. A purple rounded rectangle is drawn around the first column, indicating a selection or focus area.



Extra



LearnDelphi.org
Coding Boot Camp 2022

tStringGrid

. Cells[<col> , <row>]

.Cells[0 , 0] →

.Cells[1 , 1]

.Cells[3 , 4]



What is a *multidimensional array*?

```
var arrTimes : array[ 1 .. 5 , 1 .. 10 ] of real ;
```

		<i>Times</i>							
		1	2	3	4	5	6	...	10
<i>Weeks</i>	1	13.26	13.01	12.56	12.86	12.96	12.23	...	12.05
	2	12.56	12.66	12.66	12.11	12.50	12.44	...	12.29
	3	XX.XX	XX.XX	XX.XX	XX.XX	XX.XX	XX.XX	...	XX.XX
	4								
	5								

MONTH 1

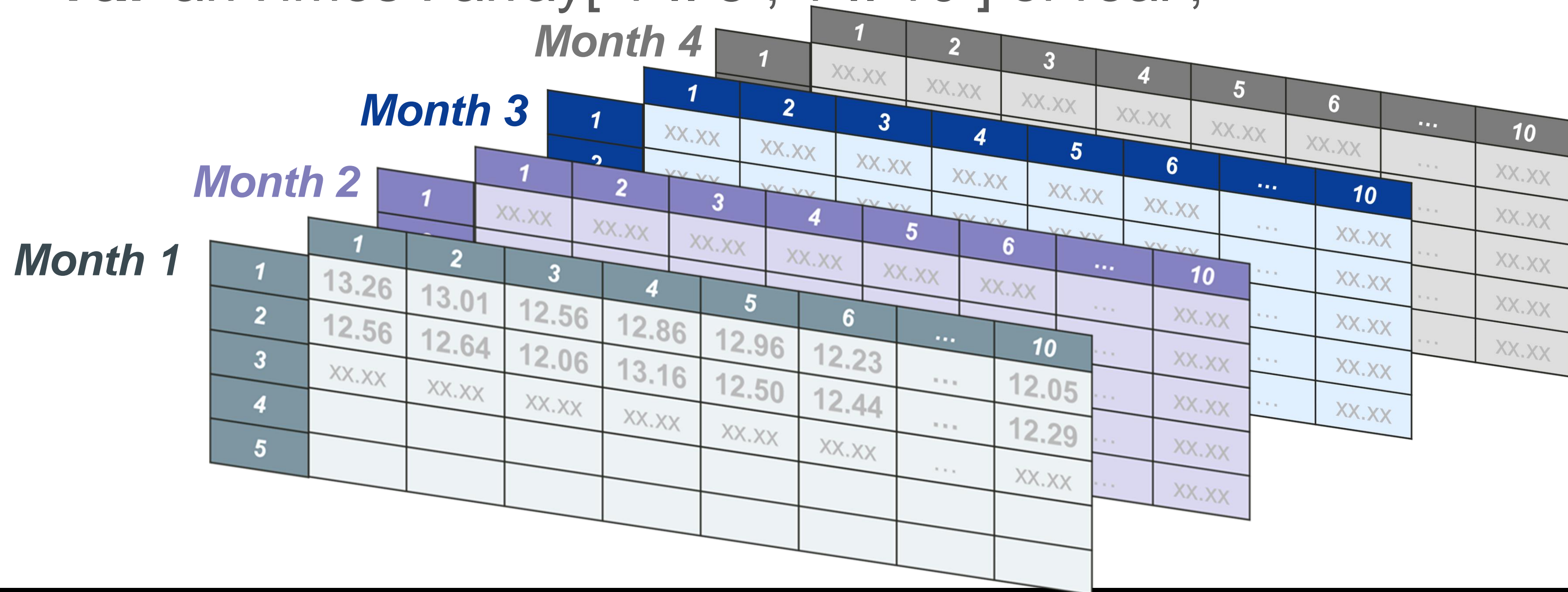




LearnDelphi.org

Coding Boot Camp 2022

```
var arrTimes : array[ 1 .. 5 , 1 .. 10 ] of real ;
```

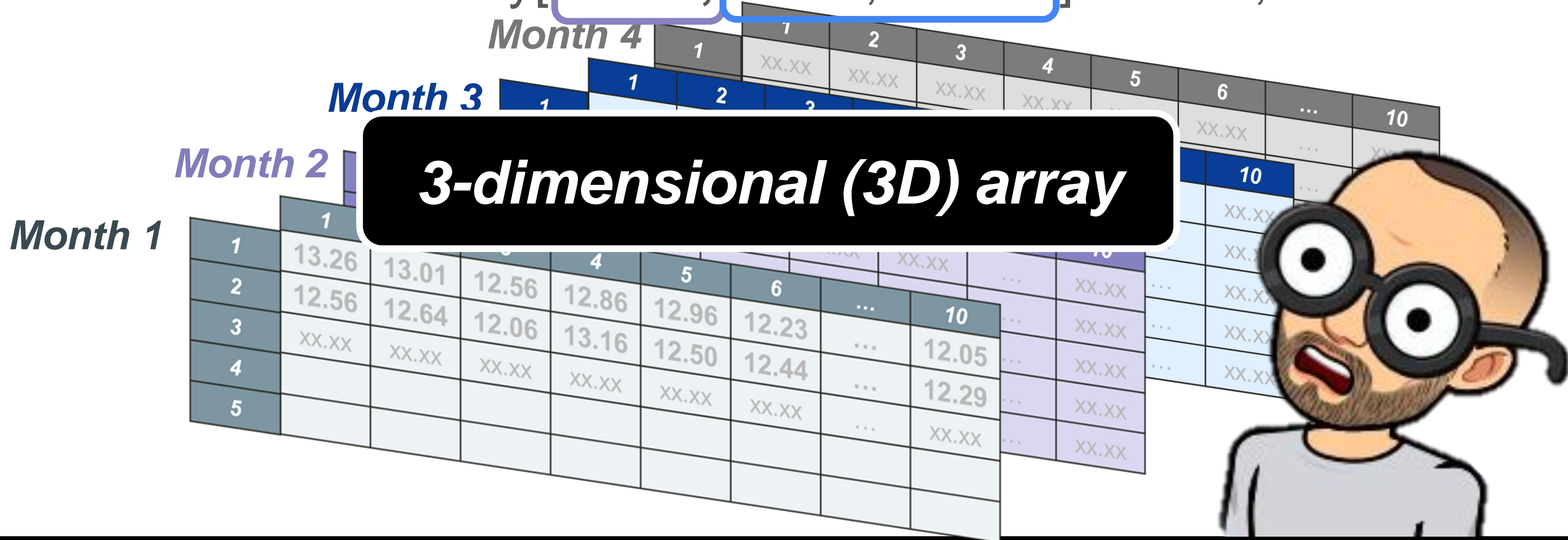


What is a *multidimensional array*?



LearnDelphi.org
Coding Boot Camp 2022

```
var arrTimes : array[1 .. 4, 1 .. 5, 1 .. 10] of real ;
```



What is a *multidimensional array*?



LearnDelphi.org
Coding Boot Camp 2022

```
var arrTimes : array[ 1 .. 4 , 1 .. 5 , 1 .. 10 ] of real ;
```

```
arrTimes [ 3 , 1 , 1 ] := 12.12 ;
```

	1	2	3	4	5	6	...	10
1	13.26	13.01	12.56	12.86	12.96	12.23	...	12.05
2	12.56	12.64	12.06	13.16	12.50	12.44	...	12.29
3	xx.xx	xx.xx	xx.xx	xx.xx	xx.xx	xx.xx	...	xx.xx
4							...	
5							...	



What is a *multidimensional array*?



LearnDelphi.org

Coding Boot Camp 2022

```
var arrTimes : array[ 1 .. 4 , 1 .. 5 , 1 .. 10 ] of real ;
```

```
for iLevel := 1 to 4 do
```

```
  for iRow := 1 to 5 do
```

```
    for iCol := 1 to 10 do
```

```
      rSum := rSum + arrTimes [ iLevel , iRow , iCol ] ;
```

	1	2	3	4	5	6	...	10
1	13.26	13.01	12.56	12.86	12.96	12.23	...	12.05
2	12.56	12.64	12.06	13.16	12.50	12.44	...	12.29
3	XX.XX	XX.XX	XX.XX	XX.XX	XX.XX	XX.XX	...	XX.XX
4								
5								



What is a *multidimensional array*?



LearnDelphi.org
Coding Boot Camp 2022

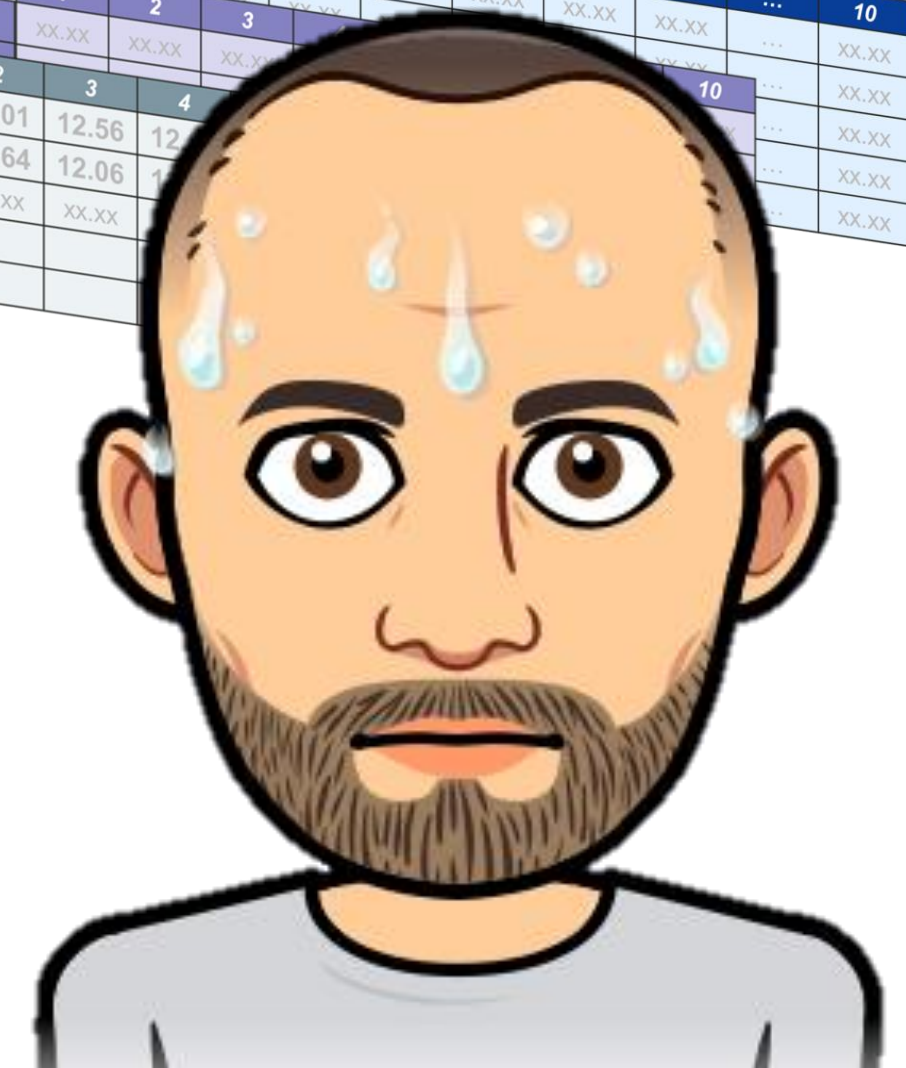
```
var arrTimes : array[ 1 .. 4 , 1 .. 5 , 1 .. 10 ] of real ;
```

4-dimensional (4D) array

5-dimensional (5D) array

n^{th} -dimensional (n-D) array

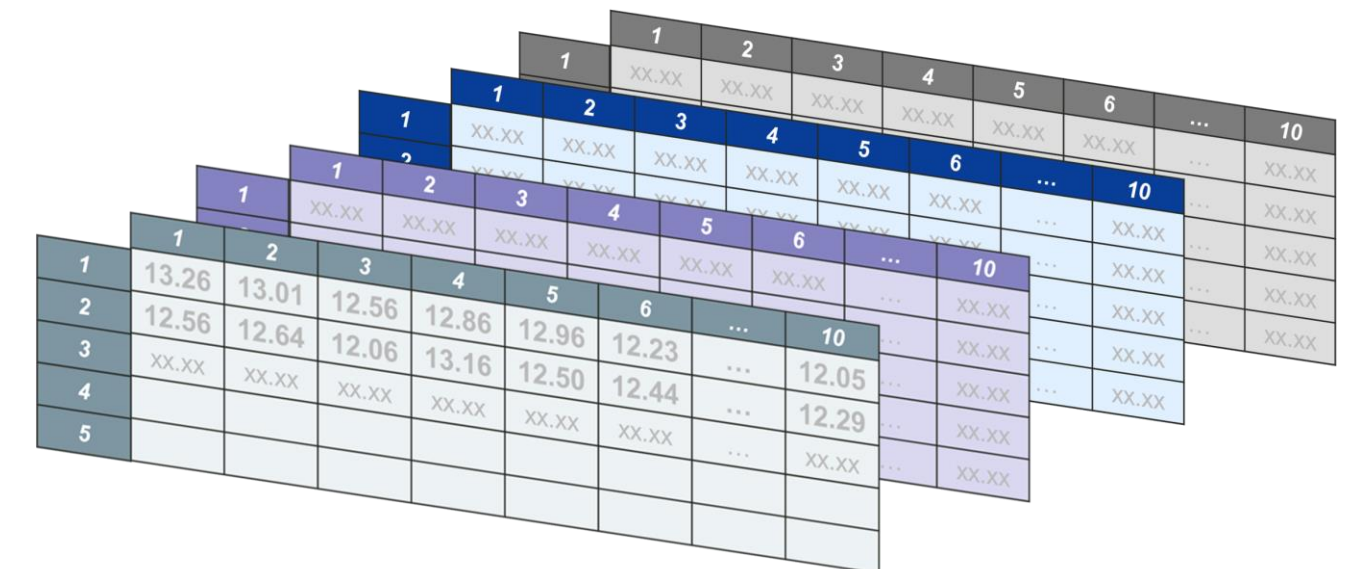
1	2	3	4	5	6	...	10
1	13.26	13.01	12.56	12.56	12.06	...	10.06
2	12.56	12.64	12.06	12.06	12.06	...	10.06
3	xx.xx	xx.xx	xx.xx	xx.xx	xx.xx	...	xx.xx
4	xx.xx	xx.xx	xx.xx	xx.xx	xx.xx	...	xx.xx
5	xx.xx	xx.xx	xx.xx	xx.xx	xx.xx	...	xx.xx



In summary

- Recap on single dimensional array
- Learned about 2-dimensional *arrays*
 - *tStringGrid*
- Declaring and using 2-dimensional arrays.
- Learned about 3-dimensional *arrays*
- Other n^{th} -dimensional *arrays*

	1	2	3	4	5	6	...	10
1	13.26	13.01	12.56	12.86	12.96	12.23	...	12.05
2	12.56	12.64	12.06	13.16	12.50	12.44	...	12.29
3	xx.xx	xx.xx	xx.xx	xx.xx	xx.xx	xx.xx	...	xx.xx
4								
5								



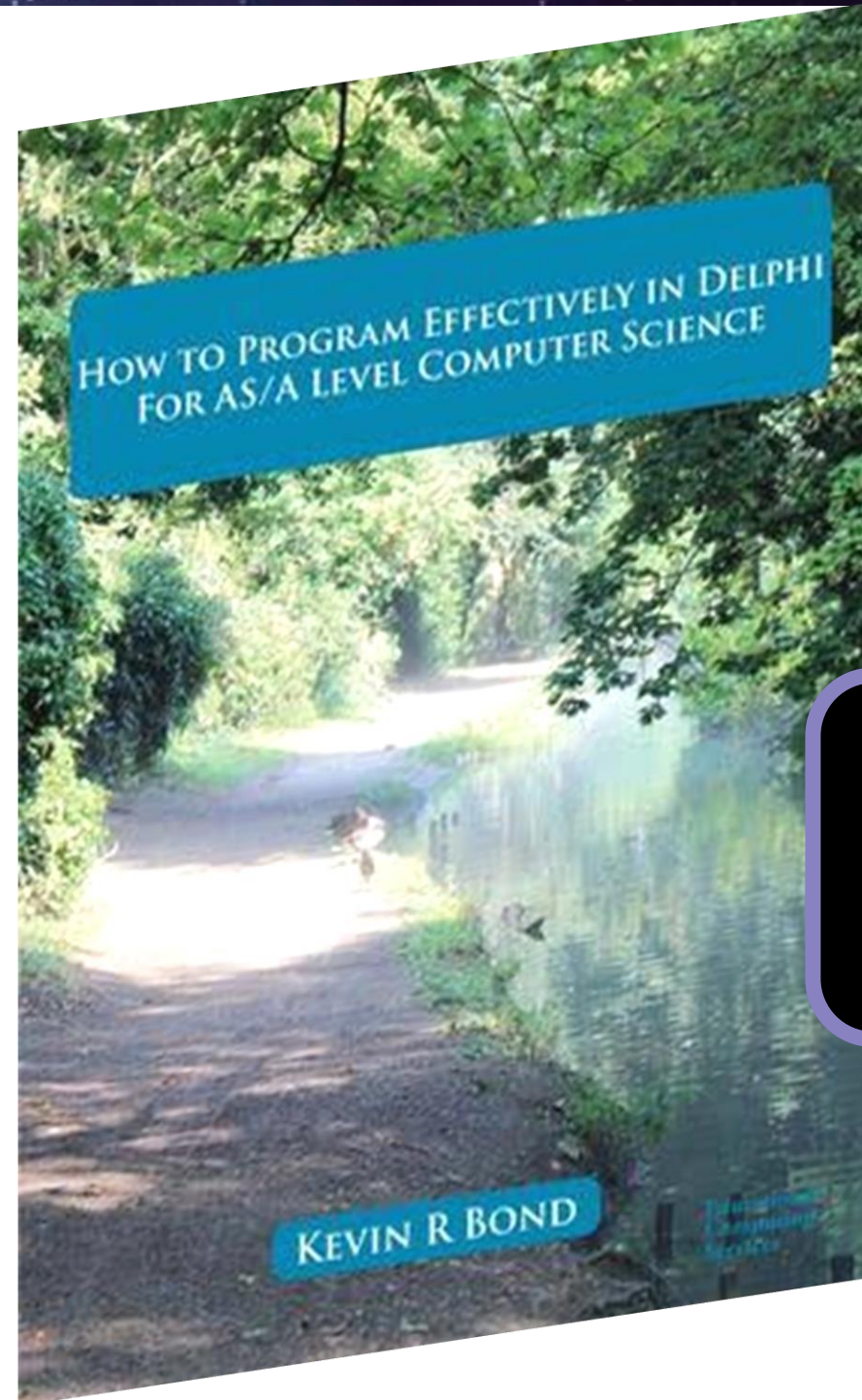
	1	2	3	4	5	6	...	10
1	13.26	13.01	12.56	12.86	12.96	12.23	...	12.05
2	12.56	12.64	12.06	13.16	12.50	12.44	...	12.29
3	xx.xx	xx.xx	xx.xx	xx.xx	xx.xx	xx.xx	...	xx.xx
4								
5								



For more practice



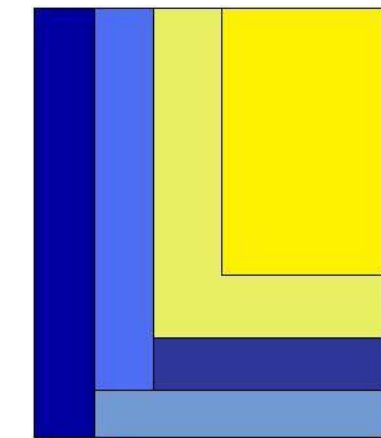
LearnDelphi.org
Coding Boot Camp 2022



Chapter 14

Arrays

Pages 237 - 243



You**Tube**

Mr Long IT and CAT

tinyurl.com/MrLong2DArrays



Thank you!



Get the code:
github.com/Embarcadero/CodingBootCamp2022

